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## **The comeback of systematic musicology: new empiricism and the cognitive revolution\***

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### **Introduction**

The term ‘musicology’ has been defined in many different ways. In 1955, the American Musicological Society described it as ‘a field of knowledge having as its object the investigation of the art of music as a physical, psychological, aesthetic, and cultural phenomenon.’ The attributes used here give the definition of musicology considerable breadth, although ‘music as an ‘art’ remains the focus of attention’.<sup>1</sup> However, in the last two decades an important shift has occurred, that is, from music as an art (or art object) to music as a process in which the performer, the listener, and music as sound play a central role. This transformation is most notable in the field of systematic musicology (a term introduced by Adler<sup>2</sup>), which developed from “a mere extension of musicology”<sup>3</sup> into a ‘complete reorientation of the discipline to fundamental questions which are non-historical in nature, [encompassing] research into the nature and properties of music as an acoustical, psychological and cognitive phenomenon’.<sup>4</sup> This reorientation did not take place exclusively in systematic musicology. For example, much of the pioneering work in the field of ethnomusicology stressed the importance of systematic methods and the need to study music in its wider social, anthropological, and cultural context.<sup>5</sup>

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<sup>1</sup> V. Duckles & J. Pasler, ‘Historical and Systematic Musicology’, in: S. Sadie and J. Tyrrell (eds.), *The New Grove Dictionary of Music and Musicians*, London 2001, pp. 490-491.

<sup>2</sup> G. Adler, ‘Umfang, Methode und Ziel der Musikwissenschaft’ in: *Vierteljahresschrift für Musikwissenschaft* 1 (1885), pp. 5-20.

<sup>3</sup> But note that, while systematic musicology may have seemed to be an extension to musicology in the late 19th century (according to Adler), one could argue that it is the original musicology. The musical questions that occupied European thinkers until the 19th century corresponded almost entirely to the category of systematic musicology (R. Parncutt, personal communication).

<sup>4</sup> V. Duckles & J. Pasler, ‘Historical and Systematic Musicology’, p. 491.

<sup>5</sup> E.g. J. Kunst, *Musicologica: a Study of the Nature of Ethno-Musicology, its Problems, Methods and Representative Personalities*. Indisch Instituut, Amsterdam 1950; A. Seeger, ‘Styles of Music Ethnography’, in: B. Nettl and P.V. Bohlman (eds.) *Comparative Musicology and Anthropology of Music*, Chicago 1991, pp. 342–355.

But systematic methods also gained more ground in, for example, the semiotic approach to music (e.g., Nattiez<sup>6</sup>). In addition, there are several ongoing developments in musicology that promote interdisciplinary research within the humanities.<sup>7</sup>

In this text three recent strands of musicological research will be briefly discussed as an illustration of the apparent international reorientation of the music sciences.

They will be referred to as empirical, computational, and cognitive musicology.

### **The role of observation: empirical musicology**

Empirical musicology grew out of a desire to ground theories on empirical observation and to construct theories on the basis of the analysis and interpretation of such observations.<sup>8</sup> The arrival of new technologies, most notably that of MIDI<sup>9</sup> and of the personal computer, were instrumental to the considerable increase in the number of empirically oriented investigations into music.<sup>10</sup> Huron refers to this reorientation as ‘new empiricism’ and considers it, along with ‘new musicology,’<sup>11</sup> the most influential movement in recent music scholarship. Huron stresses that this transformation arose within music scholarship, and he promotes the adaptation of scientific methods, such as ‘the pursuit of evidence and rigor’<sup>12</sup> – in spite of the criticism of

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<sup>6</sup> J.J. Nattiez, *Musicologie générale et sémiologie*, Paris 1987; Eng. trans. by C. Abbate as *Music and Discourse*, Princeton 1990.

<sup>7</sup> E.g. J. Kerman, *Contemplating Music: Challenges to Musicology*, Cambridge 1985; S. McClary, *Feminine Endings: Music, Gender, and Sexuality*, Minneapolis 1991.

<sup>8</sup> J. Rink, (ed.) *The Practice of Performance: Studies in Musical Interpretation*, Cambridge 1995; E.F. Clarke & N. Cook (eds.) *Empirical musicology: Aims, methods and prospects*, Oxford 2004.

<sup>9</sup> Commercial standard for the exchange of information between electronic instruments and computers.

<sup>10</sup> E.F. Clarke, ‘Rhythm and timing in music’, in: D. Deutsch (ed.), *Psychology of Music* (2nd edition), New York 1999, pp. 473-500; A. Gabrielsson, ‘The performance of music’, in D. Deutsch (ed.), *Psychology of Music*, pp. 501-602.

<sup>11</sup> New Musicology: a branch of music scholarship that is guided by ‘a recognition of the limits of human understanding, an awareness of the social milieu in which scholarship is pursued, and the realization of the political area in which the fruits of scholarship are used and abused’. D. Huron, ‘The New Empiricism: Systematic Musicology in a Postmodern Age’, Berkeley, University of California 1999, <http://www.music-cog.ohio-state.edu/Music220/Bloch.lectures/3.Methodology.html>, p. 2.

In addition, subjectivity and gender are important notions in new musicology (cf. S. McClary, *Feminine Endings*).

<sup>12</sup> In addition, a (renewed) interest in empirical research can also be observed in other areas of the humanities, including, for example, argumentation theory (F.H. van Eemeren, K. de Glopper, R. Grootendorst & R. Oostdam,

scientific methods in the postmodern literature.<sup>13</sup> In fact, the contrast between new musicology and new empiricism could not be bolder (a contrast reminiscent of the methodological differences between the sciences and the humanities). However, in the last decade these two movements seem to have merged into a revitalized systematic musicology that is based on empirical observation and rigorous method, but at the same time is also aware of, and accounts for, the social and cultural context in which music functions.<sup>14</sup>

### **The role of formalization: computational musicology**

A second development in music scholarship is the growing role of formalization and the notions of testability and falsification.<sup>15</sup> A consistent trend in formalization, most notably in music theory, has been evident since the 1960s. Early examples are, for instance, the works by Milton Babbitt, Allen Forte, and David Lewin, but this line of research is still continuing.<sup>16</sup> Theories in computational form<sup>17</sup> are a logical consequence of such formalization. These theories aim for a clear and determined scope, can be checked for consistency, and might be applied to and tested on different branches of music.

Interestingly, this has led to a greater visibility of musicology, especially outside the humanities. The fact that a theory is presented in a formal and replicable way allows for an easier

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‘Identification of unexpressed premises and argumentation schemes by students in secondary school’, *Argumentation and Advocacy* (1995) 31, pp. 151-162) and theology (J.A. van der Ven & M. Scherer-Rath (eds.), *Normativity and Empirical Research in Theology*, Leiden 2004).

<sup>13</sup> Cf. J. Natoli, *A Primer on Postmodernity*, Oxford 1997. While social contexts and contents are ‘the ultimate quarry of new musicology, they are typically pursued through the analysis of texts, rather than through more ecological, empirically oriented investigations of the production, distribution, and consumption of music’ (T. DeNora, ‘Musical Practice and Social Structure: a Toolkit’, in: E.F. Clarke & N. Cook (eds.), *Empirical musicology: Aims, methods and prospects*, Oxford 2004, p. 37).

<sup>14</sup> See for an overview Clarke & Cook, *Empirical musicology*, and a review H. Honing, ‘Weten wat je hoort. Over empirische musicologie en de groeiende rol van theorie en observatie in de muzikwetenschappen’, in: *De Academische Boekengids* 4/7 (2004).

<sup>15</sup> K. Popper, *The Logic of Scientific Discovery*, London 1959; originally published as *Logik der Forschung*, Springer, 1934.

<sup>16</sup> E.g. M. Baroni & R. Jacobini, *Proposal for a Grammar of Melody*. Les Presses de l'Université de Montreal, Canada, 1978; F. Lerdahl, *Tonal Pitch Space*, Oxford: Oxford University Press 2001; G. Assayag, H. G. Feichtinger, & J.F. Rodrigues, *Mathematics and Music*. Berlin: Springer Verlag, 2002.

<sup>17</sup> E.g. D. Temperley, *The Cognition of Basic Musical Structures*, Cambridge 2001.

formulation of hypotheses, the making of precise predictions, and, consequently, the testing and evaluation of these. As such, it makes this type of theory compelling to both computer scientists and experimental psychologists. This development could serve as an important example of how a changing methodology considered within the humanities to be of minor relevance, has a major impact outside the humanities, in that a methodology shared with the sciences served as a vehicle – a format for the transmission of ideas – that turned out to be very influential. A striking example is the theory of Lerdahl & Jackendoff<sup>18</sup> – a highly formalized theory that, consequently, has been tested and elaborated upon in a variety of disciplines, ranging from music theory and systematic musicology to music technology and music psychology.

However, it has to be noted that there are also examples that were less successful. For instance, theories on music that were developed in the sciences, such as Longuet-Higgins' work in the 1970s,<sup>19</sup> did not reach the music community in the way one would have expected, even though they were well-formulated, compelling, and in formalized form. Thus, the transmission of ideas in formalized form could well be primarily unidirectional. This could well be caused by the different types of "skepticism" apparent in the humanities and the sciences. David Huron, interestingly, argues that this might well be an important similarity between the two scientific approaches, postmodernism and scientific empiricism actually being two sides of the same coin (called skepticism).<sup>20</sup> He advocates a broadening of methodological education in both the arts and sciences.

### **The impact of the cognitive revolution: cognitive musicology**

These two developments – empirical and computational musicology – and the methods they use (i.e. empirical observation and formalization) could also be interpreted as part of a general trend in the sciences, namely the 'cognitive revolution' and the central role therein of 'computational modeling' as a methodology.<sup>21</sup> In recent decades, computational modeling has become a well-

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<sup>18</sup> F. Lerdahl & R. Jackendoff, *A Generative Theory of Tonal Music*, Cambridge, MA 1983.

<sup>19</sup> H.C. Longuet-Higgins, *Mental Processes. Studies in Cognitive Science*, Cambridge, MA 1987.

<sup>20</sup> D. Huron, 'The New Empiricism'.

<sup>21</sup> J. Fodor, *The Mind Doesn't Work that Way. The Scope and Limits of Computational Psychology*, Cambridge, MA 2000.

established research method in many fields, including systematic and cognitive musicology,<sup>22</sup> in what has to be acknowledged as a fruitful collaboration between the humanities and the sciences. In an attempt to characterize the current state of affairs, one can distinguish between several approaches to computational modeling. One, for example, aims at modeling musical knowledge. These are models originating from music theory in which a thorough formalization contributes to an understanding of the theory itself, its predictions, and its scope.<sup>23</sup> Another approach aims at constructing theories of music cognition. Here, the objective is to understand music perception and music performance by formalizing the mental processes involved in listening to and performing music.<sup>24</sup> The two approaches have different aims and can be seen as being complementary.

### **The impact of music scholarship on the cognitive sciences: music cognition**

In the 1970s, music was studied in the sciences mainly for its acoustical and perceptual properties, in what were then relatively novel disciplines such as psychophysics and music psychology. Music scholars criticized much of this research for focusing too much on low-level issues of sensation and perception, often using impoverished stimuli (e.g., small rhythmic fragments) or music restricted to the Western classical repertoire, as well as a general unawareness of the role of music in its wider social and cultural context.<sup>25</sup> However, the cognitive revolution made scientists more aware of the role and importance of these aspects. While twenty years ago, music was hardly mentioned in any handbook of psychology (or appeared only in a subsection on pitch or rhythm perception), it is now recognized, along with vision and language, as an important and informative domain in which to study a variety of aspects of cognition, including expectation, emotion, perception, and memory.<sup>26</sup> The role of musicologists and music theorists in this research seems to be greater than ever. It could well be

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<sup>22</sup> E.g. M. Leman, *Music and Schema Theory: Cognitive Foundations of Systematic Musicology*, Berlin 1995; P. Desain, H. Honing, H. van Thienen & L.W. Windsor, Computational Modeling of Music Cognition: Problem or Solution? *Music Perception*, 16, (1998), 151-166.

<sup>23</sup> E.g. Lerdahl & Jackendoff, *A Generative Theory of Tonal Music*; E. Narmour, *The Analysis and Cognition of Basic Melodic Complexity: the Implication-Realization Model*, Chicago 1992.

<sup>24</sup> E.F. Clarke, 'Rhythm and timing in music'; Gabrielsson, A. Gabrielsson, 'The performance of music'.

<sup>25</sup> D. Huron, 'Foundations of Cognitive Musicology', <http://www.music-cog.ohio-state.edu/Music220/Bloch.lectures/1.Preamble.html>, 1999.

<sup>26</sup> P. Juslin, & J. Sloboda (eds.), *Music and Emotion: Theory and Research*, Oxford 2001; D. Levitin (ed.), *Foundations of Cognitive Psychology: Core Readings*, Cambridge, MA 2002.

that cognitive musicology (or music cognition) will evolve into a prominent discipline, building on the results and insights from empirical and computational musicology.

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